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BOSTON SOCIETY OF CIVIL ENGINEERS
FOUNDED 1848

PROCEEDINGS

PAPERS IN THIS NUMBER.

"Future Opportunities and Obligations of Engineers."
George W. Fuller.

Memoir of deceased member.

MINUTES OF MEETINGS.

BOSTON, October 29, 1919. — A special meeting of the Society was held this evening at Chipman Hall, Tremont Temple, and was called to order at 7.40 o'clock by the President, Leonard Metcalf.

There were 155 members and visitors present.

The President announced that the meeting had been called at the request of the Society's Committee on Compensation of Engineers, to give to members, and other engineers, who are interested in the subject, an opportunity for free discussion of views which would be helpful to the committee.

He first called on Col. Charles R. Gow, the chairman of the Society's Committee on Compensation of Engineers. Colonel Gow explained that the committee's object in calling this meeting was, if possible, to obtain first-hand knowledge from those who had direct experience with the present conditions and situations relating to engineering remuneration, and that he was sure the committee would give careful consideration to the suggestions offered, with the hope that a report might ultimately be submitted which would suggest some reasonable and constructive

lines along which the Society can act to improve the welfare and standing of its members and the community.

The President then introduced Mr. Charles Whiting Baker, consulting editor of the *Engineering News-Record*, and a member of the Committee upon Classification and Compensation of Engineers appointed by Engineering Council.

Mr. Baker, after giving a brief account of the organization and work of Engineering Council, presented some most interesting statistics relating to what has been generally called the high cost of living, but is more truly a question of the change in value of the dollar.

The next speaker introduced was Mr. Percival H. Mosher, president of the Civil Engineers' and Inspectors' Union of Boston, who spoke particularly of the aims and objects of the organization he represented.

Mr. Beardsley Lawrence, the local secretary of the American Association of Engineers, and a member of this Society, was the next speaker. He explained the purposes for which the American Association of Engineers was founded in 1915, and said that it took for its objects the raising of the standards of ethics of the engineering profession and the promotion of the economic and social welfare of engineers.

The meeting was then thrown open to a general discussion, in which the following took part in addition to the previous speakers: Mr. William G. Addis, of the Engineering Department of the Massachusetts Highway Commission; Mr. Walter C. Voss, of the Wentworth Institute; Mr. Wanberg, Mr. Rice, and others, not members of the Society. The following members of the Society also took part in the discussion: President Metcalf and Messrs. D. C. Jackson, J. A. Lockhart, S. H. Thorndike, H. F. Bryant, H. P. Eddy, H. K. Barrows, G. T. Sampson, O. D. Rice and others.

Colonel Gow closed the discussion and moved a vote of thanks be extended to Mr. Baker and Mr. Mosher, who are not members of the Society, for their kindness in coming to assist us in this problem.

Adjourned.

S. E. TINKHAM, *Secretary*.

BOSTON, November 12, 1919. — A special meeting of the Society was held this evening in its rooms and was called to order by the President, Leonard Metcalf, at 7.40 o'clock. There were 25 members and visitors present.

In opening the meeting the President stated that it had been called at the request of some of the members, to give an opportunity to discuss, further, the paper read by Gen. R. C. Marshall at the annual meeting last March, on "Cost-Plus and Other Forms of Contract."

In the interesting discussion which followed, the following members took part: Past Presidents C. F. Allen, F. W. Hodgdon, C. R. Gow, C. M. Spofford and R. A. Hale; and Messrs. E. S. Larned, R. J. Rowe and others. Messrs. P. A. Shaw and H. E. Wheeler, of the L. H. Shattuck Company of Manchester, N. H., and Mr. Victor H. Clark, of the Stone & Webster Corporation of Boston, also contributed most interestingly to the discussion.

President Metcalf, after discussing the question before the meeting, presented for Mr. E. S. Dorr a new form of contract which is a modification of the cost-plus contract.

At 10.30 the meeting adjourned.

S. E. TINKHAM, *Secretary.*

BOSTON, November 19, 1919. — A regular meeting of the Boston Society of Civil Engineers was held this evening at Chipman Hall, Tremont Temple, and was called to order at eight o'clock, by the President, Leonard Metcalf.

There were present 97 members and visitors.

The record of the regular October meeting and of the special meetings held October 29 and November 12 were read and approved.

The President for the Board of Government reported that it had elected to membership in the grade of member, Henry Chisholm, Ernest Palmer Giles and Frederick Elmer Jones.

The Secretary presented the report of Mr. Frank A. Marston, the committee appointed to prepare a memoir of Fred Eugene Sauer, Jr., a member of the Society who died January 30, 1919, and by vote it was accepted and ordered printed in the JOURNAL of the Society.

The President announced the deaths of the following members of the Society: Past President Henry Manley, who died October 28, 1919; Edmund Grover and Irving S. Wood, both of whom died October 20, 1919. The President was requested by vote to appoint committees to prepare memoirs. The committees are as follows: On memoir of Henry Manley, Messrs. C. Frank Allen, Edward W. Howe and Laurence B. Manley; on memoir of Edmund Grover, Messrs. Richard A. Hale and Arthur L. Plimpton, and on memoir of Irving S. Wood, Mr. William D. Bullock.

The President then presented Mr. George W. Fuller, of New York, a member of the Society, who gave an interesting address entitled, "Future Opportunities and Obligations of Engineers."

A brief discussion followed on the subject matter of the address.

The remainder of the meeting was devoted to a general discussion on the work of the Society and what could be done to awaken the interest of the younger portion of our membership.

After passing a vote of thanks to Mr. Fuller, the speaker of the evening, the Society adjourned.

S. E. TINKHAM, *Secretary*.

BOSTON, November 5, 1919. — The Sanitary Section of the Boston Society of Civil Engineers held a special meeting this evening in the Society Library, Tremont Temple. The meeting was called to order by the Vice-Chairman, Henry A. Varney, at eight o'clock.

The subject of the evening was "Submerged Outfall Sewers."

Mr. Hiram A. Miller, chairman of the special committee on "Methods of Design and Construction and Results of Operation of Submerged Pipe Lines for Outfall Sewers," described several outfall sewers constructed in New Jersey by Mr. Marshall R. Pugh, of Philadelphia.

Mr. William F. Williams, engineer for the Massachusetts Commission on Waterways and Public Lands, and formerly city engineer of New Bedford, spoke on the construction and operation of the New Bedford outfall sewer.

Mr. Clarence A. Moore, assistant engineer, Metropolitan Water and Sewerage Board, described the Metropolitan outfall sewers.

Mr. William T. Barnes discussed the coefficients of discharge for the Salem, Mass., outfall sewer as determined by several measurements of flow, made during the last few years.

Mr. Erastus Worthington described the outfall sewer and pumping station at Swampscott, Mass.

The meeting adjourned at 9.50 P.M.

Members present, 31.

JOHN P. WENTWORTH, *Clerk.*

APPLICATIONS FOR MEMBERSHIP.

[December 15, 1919.]

THE By-Laws provide that the Board of Government shall consider applications for membership with reference to the eligibility of each candidate for admission and shall determine the proper grade of membership to which he is entitled.

The Board must depend largely upon the members of the Society for the information which will enable it to arrive at a just conclusion. Every member is therefore urged to communicate promptly any facts in relation to the personal character or professional reputation and experience of the candidates which will assist the Board in its consideration. Communications relating to applicants are considered by the Board as strictly confidential.

The fact that applicants give the names of certain members as reference does not necessarily mean that such members endorse the candidate.

The Board of Government will not consider applications until the expiration of twenty (20) days from the date given.

BUDD, GEORGE, JR., Boston, Mass. (Age 31, b. London, England.) Received general education at Whitgift College and City of London College; served four years' apprenticeship to Wantage Engrg. Works, England; received technical education at City and Guilds Technical College, London, graduating in 1910. From 1911 to 1912, draftsman with Deane Steam Pump

Co.; in 1912, draftsman with Coburn Trolley Track Mfg. Co.; from 1912 to 1913, draftsman with Bergen Point Iron Works, Bayonne, N. J.; from 1913 to 1914, engineer with Haaman & Co. Iron Works; from 1915 to 1916, engineer and designer with Donnelly Iron Works, Lowell; from 1916 to 1917, structural designer with Lamson Conveyor Co.; from 1917 to 1919, Senior Master Engr. in charge of topographical office with Am. Exped. Forces; is now designer and checker on reinforced concrete and steel with Harry M. Hope Engrg. Co. Refers to W. W. Clifford, C. M. Durgin, E. P. Rankin, M. R. Sumner and J. L. Tighe.

DANFORTH, GEORGE CLAPP, Augusta, Me. (Age 38, b. Gardiner, Me.) Graduate of Mass. Inst. of Technology, 1903. From 1903 to 1909, on miscellaneous municipal work, including sewers, water works and roads; in 1909, on timberland topographic surveys; from 1910 to 1911, on railroad location; from 1912 to 1914, assistant engineer with Maine Water Storage Comm.; from 1914 to 1917, assistant engineer with Maine Public Utilities Comm., in charge of Water Resources Div.; from 1917 to 1919, capt., Engrs., Am. Exped. Forces, serving in France and Germany; is now chief engineer, Maine Water Power Comm. Refers to H. S. Boardman, H. K. Barrows, T. W. Clark, C. H. Pierce, and W. H. Sawyer.

GREEN, HOWARD WHIPPLE, Woonsocket, R. I. (Age 26, b. Woonsocket, R. I.) Graduate of Clark College, Worcester, 1914, degree of A.B.; received degree of S.B. in sanitary engineering from Mass. Inst. of Technology, 1916; received degree of S.B. in sanitary engineering from Harvard University, 1916. From June to September, 1916, rodman and instrumentman, and from September, 1916, to March, 1917, cost engineer with H. Koppers Co. of Pittsburgh, Pa., on by-product coke oven job for National Tube Co. at Lorain, Ohio; from March, 1917, to September, 1919, chemist with Panama Canal Commission in Canal Zone, during which time he acted as chief bacteriologist, Miraflores Water Purification Plant, and engineer of tests, Municipal Div.; from June, 1919, to date, sanitary engineer with International Health Board of Rockefeller Foundation on malaria control through antimosquito measures. Elected a junior December 15, 1915, and now desires to be transferred to grade of member. Refers to C. B. Breed, G. L. Hosmer, L. J. Johnson, Dwight Porter, C. M. Spofford and G. C. Whipple.

HALL, WILLIAM WHEELER, JR., Worcester, Mass. (Age 23, b. Malden, Mass.) Student at Worcester Polytechnic Inst. from 1914 to 1917; from 1917 to 1919, in U. S. Army; is now senior at Worcester Polytechnic Inst. in sanitary civil engineering course. Refers to C. M. Allen, A. W. French and H. C. Ives.

SHEILS, HENRY CONNOR, Roxbury, Mass. (Age 25, b. Boston, Mass.) Graduate of Mass. Inst. of Technology, 1915, civil engineering course; did post-graduate work at M. I. T. in 1916. During summers of 1907 to 1913, with Coughlan and Sheils, general contractors; during summers of 1914 and 1915, with Coleman Bros., contractors; from 1916 to 1917, with National Waterproofing Co.; from December, 1917, to March, 1919, in U. S. Naval Aviation Corps; from March, 1919, to date, general contractor. Elected a

junior March 21, 1917, and now desires to be transferred to grade of member. Refers to J. W. Howard, L. J. Johnson, Dwight Porter, J. T. Scully, C. M. Spofford and J. A. Starr.

STACKPOLE, MINER REGINALD, Boston, Mass. (Age 30, b. Sanford, Me.) Took I. C. S. courses in surveying and mapping and in municipal engineering during years 1907 to 1911; graduate of Univ. of Maine, 1917, civil engineering course, degree of S.B.; from 1909 to 1911, rodman and chainman for various parties on variety of work in Maine; during summers of 1912 and 1913, engaged in general land surveying and municipal engineering in Sanford, Me.; during summers of 1914 and 1915, transitman, and during summer of 1916, resident engineer with Maine Highway Comm.; from June, 1917, to July, 1919, junior engineer, and from July, 1919, to date, assistant engineer in Water Resources Branch, U. S. Geological Survey. Refers to H. S. Boardman, N. C. Grover, E. O. Hathaway, C. H. Pierce and D. M. Wood.

LIST OF MEMBERS

ADDITIONS.

CHISHOLM, HENRY.....16 Bayswater St., East Boston, Mass.
MIRICK, GEORGE L.....64 Hemenway St., Boston, Mass.

CHANGES OF ADDRESS.

BEAN, THOMAS W.,

Care of Turners Falls Power and Electric Co., Turners Falls, Mass.

BREEN, ANTHONY A.....112 Central St., Somerville, Mass.

BUNKER, PAGE S....Superintendent of Parks and Forester, Fitchburg, Mass.

CASEY, JOHN J.....19 Fenno St., Roxbury, Mass.

CLARKSON, EDWARD H., Jr...Care of State Board of Health, Little Rock, Ark.

DAVIS, HAROLD F.....Forest St., Reading, Mass.

ELKINS, CLAYTON R...Central Union Depot Bldg., Room 308, Cincinnati, Ohio

FOSTER, WILLARD M.....Nashua, N. H.

HAMMOND, N. LeROY.....141 State House, Boston, Mass.

IVERSON, THOMAS.....15 School St., Boston, Mass.

REEDS, CLARENCE.....904 Main St., Hartford, Conn.

RICH, MALCOLM.....28 John St., Ilion, N. Y.

ROBINSON, BYRON A.....Bellows Falls, Vt.

SAWTELLE, HARRY F.,

Care of Lockwood, Greene & Co., 245 State St., Boston, Mass.

THORPE, GEORGE H.....904 Main St., Hartford, Conn.

UMSTEAD, CHARLES H.....Treasury Bldg., Room 400, Washington, D. C.

DEATHS.

SHAW, EDWARD S.....October 3, 1919.

STEARNS, FREDERIC P.....December 1, 1919.

EMPLOYMENT BUREAU.

THE Board of Government maintains an employment bureau for the Society, to be a medium for securing positions for its members and applicants for membership, and also for furnishing employees to members and others desiring men capable of filling responsible positions.

At the Society rooms two lists are kept on file, one of *positions available* and the other of *men available*, giving in each case detailed information in relation thereto.

MEN AVAILABLE.

447. Age 37. Graduate of Brown Univ., 1903, civil engineering course, degree of S.B. Has had fifteen years' experience as draftsman, including three years on railway maintenance, nine on sanitary and drainage engineering work, one as mechanical draftsman, and two as draftsman and instrumentman on village, property and topographical surveying. Desires position as draftsman and assistant to consulting engineer. Salary desired, \$100 per month.

492. Age 46. Has had twenty years' experience, chiefly on design and construction of dredging machinery, including bucket, dipper and hydraulic types; has also had experience on pumps, engines, hoisting machinery and foundations. Desires position as draftsman or erection engineer. Salary desired, \$200 per month.

493. Age 37. Student for three years at Harvard University. Has had four years' experience on railway location and construction in British Columbia and two years on land and timber surveys as rodman, levelman, topographer, etc.; served as line sergeant, Engrs., with Am. Exped. Forces. Desires topographical work. Salary desired, \$75 per month and expenses.

494. Age 34. Graduate of University of Pennsylvania, 1909, degree of B.S. in civil engineering. Has had about ten years' experience, chiefly on railroad work, including one year on general railroad maintenance, two years in charge of yard and dock construction, over three years in direct charge of all maintenance and construction on about 250 miles of city and interurban electric railway, about two years as assistant engineer on extensive hydro-electric development for railway and light company, and more than a year in selling special track work for iron and steel company. Desires to locate in New England, preferably in or near Boston.

495. Age 21. Has grammar school education supplemented by six months at Northeastern College. Has had about three years' experience as transitman and chief of party on survey work, and about six months as leveler on construction of railroad yard. Desires position as transitman or chief of party. Salary desired, \$25 per week, if work is near Boston.

496. Age 37. Received education in public schools and from I. C. S. course. Experience has been chiefly in surveying, but has done some construction work; was on housing work with U. S. Shipping Board for a time. Desires position as transitman. Salary desired, \$160 per month.

LIBRARY NOTES.

RECENT ADDITIONS TO THE LIBRARY.

U. S. Government Reports.

Clays and Shales of Minnesota. Frank F. Grout.

Coal in 1917: Part A, Production; Part B, Distribution and Consumption. C. E. Leshner.

Coke and By-Products in 1916 and 1917. C. E. Leshner and W. T. Thom, Jr.

Decline and Ultimate Production of Oil Wells, with Notes on Valuation of Oil Properties. Carl H. Beal.

English Port Facilities. F. T. Chambers.

Mineral Resources of Seward Peninsula, Alaska. George L. Harrington.

Mining and Mineral Deposits in Cook Inlet-Susitna Region, Alaska. Stephen R. Capps and others.

Mining in Fairbanks, Ruby, Hot Springs, and Tolstoi Districts, Alaska. Theodore Chapin and George L. Harrington.

Mortality Statistics for 1917.

Natural Gas and Natural-Gas Gasoline in 1917. John D. Northrop.

New Science of Industrial Physiology. Frederic S. Lee.

Oil Shale in Western Montana, Southeastern Idaho, and Adjacent Parts of Wyoming and Utah. D. Dale Condit.

Standards for Measuring Efficiency of Exhaust Systems in Polishing Shops. C.-E. A. Winslow and others.

Tight and Slack Cooperage Stock Production in 1918. Franklin H. Smith and Albert H. Pierson.

Water-Supply Paper 485.

State Reports.

Pennsylvania. Annual Report of Commissioner of Health for 1915.

City and Town Reports.

Cambridge, Mass. Annual Report of Water Board for 1917-18.

New Orleans, La. Semi-Annual Report of Sewerage and Water Board, December 31, 1918.

Miscellaneous.

Canada, Department of Interior, Natural Resources Intelligence Branch: Natural Resources of Manitoba, Saskatchewan and Alberta.

Chlorination of Water. Joseph Race. 1918.

Conveyance and Distribution of Water for Water Supply. Edward Wegmann. 1918.

Johnson's Materials of Construction. Rewritten by M. O. Withey and James Aston; edited by F. E. Turneaure. 5th ed. 1919.

Shore Processes and Shoreline Development. Douglas Wilson Johnson. 1919.

Water Purification. Joseph W. Ellms. 1917.

Wood and Other Organic Structural Materials. Charles Henry Snow. 1917.

LIBRARY COMMITTEE.

BOSTON SOCIETY OF CIVIL ENGINEERS
FOUNDED 1848

PAPERS AND DISCUSSIONS

This Society is not responsible for any statement made or opinion expressed in its publications

**FUTURE OPPORTUNITIES AND OBLIGATIONS OF
ENGINEERS.**

BY GEORGE W. FULLER,* MEMBER BOSTON SOCIETY OF CIVIL ENGINEERS.

(Presented November 19, 1919.)

THIS is a period of readjustment. The Great War has brought this about for many men and many things.

Exigencies of the military establishment in its various ramifications have shown weaknesses and inadequacies of earlier arrangements.

War experiences show the need of more efficient organization and of the supercession of old-fashioned programs by better ones.

This applies practically to all groups of men, and spreads out into numerous fields of activities.

For some time engineers have been striving with this situation. Like other groups of citizens, they face the obligation of doing their full share in placing the conduct of public affairs on a higher plane of performance. How can engineers best perform this obligation?

I am aware that this is an unusual time in the history of these movements. This is true of nations and of governmental agencies coming under them. And it is particularly true of professional, civic and trade groups.

On the eve of ascertaining the outcome of a development committee of one of the national engineering societies, and when

* Consulting Engineer, 170 Broadway, New York, N. Y.

coöperative efforts of engineers are taking shape in furtherance of a proposed National Department of Public Works, it is not fitting to attempt at this moment to be too positive as to remedial measures. But while we should not prejudge forthcoming recommendations it is necessary to create and maintain and strengthen a wide appreciation of the opportunities of engineers to play, at this particular period, a full part in a betterment program for the future. At a period when civilization is merging from its greatest upheaval and a new order of things is sought in various channels, it is the duty of engineers to prepare to act wisely and promptly in discharging their obligations during these stirring times.

I have not come with any radical views or novel remedies to put before you. It is doubtful whether it is wise at this particular moment to attempt to speak very positively on how best to proceed. Surely we should not attempt to draw final conclusions without having before us all the evidence of those investigators who have been diligently considering these matters for many months.

My purpose this evening will have been served if I succeed in refreshing your memories again as to the serious need of recognizing in the very early future the substantial obligations resting upon engineers, and in urging you on in your preparations.

This applies to us both as engineers and as citizens. Opportunities are now great. We must soon weigh available evidence as to methods of procedure and coöperate effectively in adopting those which seem best.

I propose to outline briefly a few views pertaining to some of the main topics engaging the attention of engineers. This is a period when it is not wise to devote ourselves too much to criticism of past and present conditions. Certainly our efforts should not stop there. We must take conditions as we find them and look them squarely in the face. The obligation rests on every engineer to study conditions and remedies and thus prepare himself to do his "bit" in the steps which should shortly be taken in the direction of progress.

Technical Aspects.—For over seventy years engineering organizations in the United States have been accumulating a

large fund of engineering knowledge which has been discussed and put on record for future use. It constitutes the greatest asset of our profession, and has played an important rôle in making progress along technical lines. For over twenty-five years I have been a member of the Boston Society of Civil Engineers, and I am always glad to record the substantial benefits which I have derived from the scientific information issued from this source. I hope that this will continue to be the case with this and other technical organizations. We must all remember that the coming generation is entitled to derive benefit from our experience as truly and fully as we have derived benefit from the technical papers and discussions of those who came before us.

I am one of those who believe that whatever betterments may come along other lines, technical organizations of engineers should not lose sight of the importance of continuing this element of their structure. This is one of the strong and not one of the weak points of engineering organizations. We should be careful not to lose our strength along technical lines as we plan for broadening our fields of activities.

Some engineers have been and always will be of greatest strength along technical lines. Such men should in the future be encouraged in their normal groove, and present engineering organizations seem to serve that purpose reasonably well.

I shall say no more on this topic beyond urging that we should not be hasty in giving up the good of present arrangements as we proceed in our endeavors to meet our obligations along lines of a non-technical nature.

Engineers need in particular to build up their strength along non-technical lines, both for the good of their country and of themselves. I take it that few if any engineers are so ultra-conservative or out of touch with modern affairs as not to agree to this proposition. In any event I shall endeavor to stress a few situations along welfare lines.

Human Aspects. — Engineers as a group of men have a very low coefficient of adaptability as they come in contact with other groups of men. The very nature of their technical point of view and their experience in earlier years seems to prevent many engineers from meeting other men in a fair spirit of compromise

in an effort to draw negotiable conclusions from all the information at hand.

Thus the engineer, as he comes in contact with the architect, lawyer, doctor or business man, has ordinarily very little facility in making judicious adjustments. Most human events of great importance are solved by conclusions drawn from premises that are established by more than one individual, and usually by more than one group of men. The engineer, convinced that his conclusions are sound from his premises, and that his premises in turn are the only correct ones, is frequently ignored by more experienced men of affairs. Thus the profession as a whole is belittled as a result of indecision or inability of many of its members to come to an agreement on the basic assumptions of a practical proposition. Engineering obviously deals with mathematics in some of its bearings, but as a group of men, engineers do not seem to appreciate the significance of fictitious accuracy. They have a tendency to make computations show an answer to the fourth decimal place when it is truly accurate only in the units or tenths place. Their education does not facilitate a broad, practical view of things.

In my opinion, one of the chief duties of the engineers as a group of men is to learn the lesson of judicious compromise and to recognize that all trained men are able to reach sound conclusions or premises. In the larger problems of human affairs, correct premises usually will be attained only by the consensus of opinion of several groups of interested men, and not by that of the engineer or any other single group.

No longer can the engineering profession afford to promote, either in their education or in their relation as citizens in after life, such a narrow technical viewpoint as in the past. They must become humanized. They should learn to recognize quickly the soundness of a great many practical, helpful suggestions in connection with their daily work, which come from contractors, architects, lawyers, bankers and business men, who are not technically as accomplished as they but who frequently are more far-seeing discerners of basic assumptions upon which a practical proposition should be founded.

The older engineers certainly face the responsibility of teach-

ing and leading younger members of the profession to bring about effective coöperation, which is imperative for advancement along several pressing lines. This must be done not only on an individual basis but on a wholesale scale which requires organization to that end.

Compensation of Engineers. — It appears that over 90 per cent. of the engineers in this country work on a salary. They are employees and not employers.

The high cost of living which has made such a profound impression on the affairs of our citizens during the past few years has distressingly affected many members of our profession. It is doubtless true that those connected with certain industries have been unusually prosperous during the past few years, but unfortunately this is not the situation with the great majority of engineers, particularly those on the pay roll of governmental agencies.

At a time when wage scales have been advanced for many groups of workers, in the effort to adjust incomes to increases in living costs, it is well for us to bear in mind that there are many engineers who for years have received no increase in compensation. It is my understanding that engineers in municipal service are unhappily situated in this respect to a greater degree perhaps than is found almost anywhere else. Excluding city or chief engineers and their first deputies and also departmental and divisional heads, the available data indicate that the average annual compensation of members of municipal engineering organizations in this country is about \$1 830. Another significant fact is that these organizations which cover the complete personnel of engineering organizations in the cities making reports, with the exception of those coming under the four groups above stated, show an average age of thirty-nine years.

We also have to bear in mind that even more embarrassing circumstances surround some members of our profession, such as those as are now stated to be receiving as chief engineers of Southern drainage districts less than one hundred dollars per month by legislative enactment and who are wondering whether the compensation bonuses which they now receive will ever become a subject of investigation, with the result that they may

have to refund the difference between their legal salary and their actual compensation, which at best is scarcely above the rate of a fairly skilled laborer.

Civil Service requirements, classification lists and budget restrictions are some of the serious obstacles which are oppressing this group of men who, under unusual difficulties, are striving to perform a service which the public can ill afford to have neglected or performed inadequately.

One can scarcely refrain in this connection from thinking of the success attending the efforts of labor organizations and trade unions. Business men have developed their local organizations during the past few years, and have built up a central body through the United States Chamber of Commerce, with headquarters at Washington.

Even farmers, who are supposed to be the most conservative and individualistic class of citizens we have, are now organizing and arranging to have in Washington headquarters for a central organization. Why should not engineers organize effectively?

If the compensation factor were the only one, it seems clear that the older engineers have a distinct obligation here to render all the aid they possibly can to the younger man. This is something that can be done only by effective coöperation and through coördination of effort.

Civic Relations. — Engineers as a group stand solidly for good Americanism and good citizenship. Their chief characteristic is absolute honesty.

And yet they are strikingly indifferent as a group of citizens in their relation to public affairs. They seem to be so occupied with their own undertakings that they hold aloof to an astonishing degree from pressing questions of a governmental or community nature.

Engineers are said to represent somewhere from one third to one half of one per cent. of the voting strength of the country. As a group we are too small to cut much figure by ourselves, even if we were organized to work together effectively outside of technical lines.

This is a period of reorganization of state and various local governmental agencies coming thereunder. On many of these

questions the advice of engineers along broad lines will be helpful. It is gratifying to recognize that in some measure we are making progress in this direction. If we cannot perform as representatives of engineering organizations then we should affiliate with civic organizations, and preferably we should do both. Engineers should start at once to correct the public view which in some cases seems to be that engineers are of aid in public affairs in spite of rather than because of their technical training. Obviously, technical knowledge should be availed of in a practical way.

One of the humiliating things with which engineers have to contend is that in numerous cases, in carrying out engineering undertakings, non-technical administrators give little or no heed to the judgment of their engineering advisers. This is largely due to the fact that the engineers are unable by reason of education and habit of thought to impress the worth of their views on the other fellow. This is a situation by no means universal, but of sufficiently frequent occurrence to need most careful consideration.

Effort in Boston, New York and a number of other cities shows that engineers can accomplish a good deal if they will coöperate and build up the necessary team strength.

There are many factors with which to contend besides the traditional aloofness of the engineers. Among them, in regard to the salary question, is the continuity of service, which in some instances is supposed to depend upon responsiveness to the wishes of the non-technical administrative superiors. Things in this country are by no means on as sound a basis as in some of the European countries, where men of technical merit are not only listened to but continued in service regardless of the caprices of local politics, and ultimately are retired on a pension when old age comes upon them.

In this period of readjustment, engineers have an opportunity to make their position relatively more advantageous in the future than at present. In these days no man or group of men can stand still. We must go either forward or backward.

Welfare Organization. — It is in this channel that there is greatest need of coöperation and of coördination of effort by engineers.

This is necessary not only for the correction of poorly paid engineers, but in order that engineers as a group may function adequately on public affairs.

In the view of some, it is hopeless to anticipate that our national engineering organizations, however successful they may be along technical lines, can possibly bring adequate support to the distinctly different but equally important proposition of advancing welfare work. Existing organizations, established for technical purposes only, cannot bring about the personal contact that is essential. Specialization in the broad engineering field has naturally brought classifications of societies and of men. Civil engineers and electrical engineers are not interested in the same technical subjects and are not well acquainted with each other.

But for welfare work special fields cannot be recognized. Differences must be put and kept aside and, therefore, the character of the organizations of the technical societies must be preserved and welfare facilities built up from the bottom. We must organize on lines of common interest and common need.

Local units for local problems are essential. We must find a way to bring about unification and solidarity among engineers if success is to attend welfare efforts. To do this it is necessary to overcome the apathy and inertia of the great majority of the members of the profession.

At the moment we must wait the outcome of our development committees. But we should not consume one day needlessly in preparing our program for procedure.

In this connection we must not overlook the American Association of Engineers. I understand that this organization is growing by leaps and bounds, adding perhaps one thousand new members per month. It is growing in strength particularly in the West. What its future may be I do not know, but I take it that it is striking a sympathetic chord among the members of this profession who are most determined to better existing conditions.

If this new organization is well managed and asserts its intention not to compete with technical organizations on technical work it seems obvious that we have more than the beginnings

of a welfare organization on a sound basis. This movement seems bound to come up for immediate comparison with the efforts that can be made by technical organizations in doing good work in welfare matters. What is needed is quick action.

Young Men Leaders. — There is an old saying that old men are needed for counsel and young men for action.

In welfare matters there is a great handicap in the engineering field through a general limitation of acquaintance of older and younger men, who do not seem to know each other well enough to enlist sympathetic and mutually responsive action.

Many older men seem to be set in technical and executive grooves, and are so thoroughly occupied that they are not inclined to coöperate very much with younger men. This should be corrected.

I believe that young leaders should be selected, instructed, advised and strengthened so far as practicable, so as to serve as leaders of the large numbers of young men in the engineering profession. This suggestion involves initiative upon the part of the younger men themselves. If they will but come forward with definite schemes for betterment and with men to properly present them, they will be accorded very sympathetic hearing by the older men.

This should give contact which is sadly needed now not so much for technical as for welfare work. However, such contact would prove helpful in my opinion in every way. Leaders cannot be made over night. Hard work is required to study out the situation, and it is important to get action without delay.

Construction Division of the Army. — You have all heard a good deal about the work of the Construction Division of the Army in performing emergency work in this country incident to the Great War. I mention it to-night not with the view of going into details but in order to use it as an illustration of what civil engineers and contractors can do along organization lines when they are sufficiently energized. This division brought together with astonishing speed for the aid of the Government the best practice in civil life. It established some new principles for the conduct of government affairs. In fact, as an organization that did about one billion dollars' worth of work in eighteen

months, it is very instructive to study its organization chart. The men having that organization in hand are entitled to credit for establishing some sound principles as applied to the management of large affairs. They proceeded on the following bases:

1. No man in immediate charge of work is given responsibility beyond what may be reasonably expected as regards the range of types of tasks which one man can look after with the aid of proper assistants; and the same is true as to magnitude of work.

2. The organization is such that the man in final authority in charge of policy, finances, labor, materials and other controlling items can be reached without delay by the man in charge of any enterprise.

Adherence to these fundamental aspects of efficient organization for large enterprises avoids the delays incident, on the one hand, to pigeonholing by superiors, and on the other hand to the non-functioning of subordinates who have neither jurisdiction themselves nor access to those who are so equipped.

Decentralization was one of the outstanding features of the performance of the Construction Division, which it should be made plain was essentially a young man's organization.

Further, the efforts of this group of war workers showed strikingly what immense advantages accrue through adequate direction of effort.

It is not necessary to dwell here on the future of this division or the outcome, in the army reorganization bill now being formulated in Congress, with respect to the perpetuation of the methods built up by this division. Whatever the outcome, I wish to make it plain that in my judgment there is no reason for the comment sometimes heard that the continuance of this division is in support of some of its original personnel. I feel strongly that it is the methods and not the personnel of the division that it is important to secure for the future advantage of the Government.

Furthermore, as to personnel, that has disappeared to a very substantial degree, and the question of the future deals with the ability to retain within the organization sufficient men of adequate experience rather than with the fear that it may become a bureau saturated with the normal characteristics of governmental bureaucracy.

Let me urge you to keep clearly in mind this striking example of what civilian engineers and contractors can do by way of organization and joint action when sufficiently aroused. This is one of the hopeful features in connection with the question of success attending present opportunities for engineers to organize along better lines.

National Department of Public Works.—This subject is known well to you, I am sure. For two generations civil engineers have sought to get the engineering work of our national government conducted on better lines than at present. Without a doubt it is a move in the right direction and should be adopted.

This is an unusual period, and this particular movement for a National Department of Public Works offers one of the several well-defined propositions on which engineers may progress in building up their strength throughout the country in a coöperative and coördinated way for real action.

It is gratifying to learn that matters in this respect are moving so well in this district.

In the early future matters should be speeded up on this proposition, and finances arranged so as to meet the expenses of making an adequate preparation for supporting the Jones-Reavis bill in Congress.

A few months ago it was thought that serious opposition would be encountered from the Engineer Corps of the army. But it appears that this will not be insurmountable by any means. Indeed, it is believed by many that 90 per cent. of the Engineer Corps would welcome a departure from its earlier traditions. The corps will probably have its hands full on military matters, and undoubtedly would profit from more intimate contact with civilian engineers and the methods of the latter. Coöperation between the army and civilian engineers should prove of benefit from all angles, and should be brought about in an effective way as promptly as practicable.

As to Organization Needs.—There are two phases of our needs as to organization of engineers. One relates to reaching and interesting the younger and less technically accomplished men in this line of work. The other involves the coördination and guidance of concerted action.

Our present Engineering Council has taken important steps recently, but seems to be more loosely attached to the underlying units or groups than is desirable. All of us await with interest the outcome of the Conference Committees on Development on behalf of the National Societies.

In reaching the less conspicuous workers in our lines, and in making all men of high or low attainments keep in step and move solidly in the right direction, we would do well to note how the architects have been proceeding. In New York State is a new association where heads of large firms join with draftsmen in their employ provided they are over twenty-one years of age. In its bulletin it states:

“ If architecture is to take its rightful place in the upbuilding of the new world, there must be joined in one effort all those who are engaged in architectural work — whether as employers or employees, beginners or experts. The whole group of architects and those who are to be the architects of the future must move forward together.”

It is up to the engineers to decide promptly how best to effect needed solidarity among all of its workers.

MEMOIR OF DECEASED MEMBER.

FRED EUGENE SAUER, JR.*

FRED EUGENE SAUER, JR., son of Fred E. Sauer, of Salem, Mass., and Lillian Z. (Taylor) Sauer, of Marlboro, Mass., was born at Everett, Mass., April 3, 1893, and died in Melrose, Mass., January 30, 1919.

Mr. Sauer received his early education in Everett, graduating from the high school in 1910. He then entered the Massachusetts Institute of Technology, and graduated from the civil engineering course in 1914, with the degree of bachelor of science.

During the early summer of 1914 he served as rodman with the N. Y., N. H. & H. R. R. at Providence, R. I. He then entered the service of the Public Service Commission of New York in August, 1914, as assistant engineer on subway construction, being largely concerned with matters of design and estimates. He left the work of the Commission in February, 1916, and joined the organization of Post & McCord, New York City, as a structural draftsman, which employment continued until August, 1916.

Mr. Sauer's next residence was in Washington, D. C., where he was employed as structural draftsman in the office of the Bureau of Yards and Docks of the Navy Department for the period from August, 1916, to November, 1917. His work involved studies in connection with some of the naval developments of that period, which added to the interest as well as to the breadth of his experience.

In November, 1917, Mr. Sauer left the Navy Department, and came to Boston to join the staff of Metcalf & Eddy, which connection continued until his death. His work as assistant engineer on design, with this firm, involved a variety of problems requiring careful study and the exercise of ingenuity. This seemed to appeal to him especially, and as he was ambitious, as

* Memoir prepared by Frank A. Marston.

well as studious by nature, he established an excellent record for service.

He was a member of the Boston Society of Civil Engineers, and actively interested in general engineering work, particularly methods of construction involving unusual difficulties.

During the late fall of 1918, Mr. Sauer, acting for himself, supervised the raising of two lines of 24-in. water main about seven feet for the Boston & Lockport Block Company. These pipes, the property of the Metropolitan Water and Sewerage Board, crossed land of the company which it was proposed to develop, thereby necessitating the raising of the pipes, subject to the inspection and approval of the engineers of the board. This work was carried on to successful completion, in spite of numerous difficulties, not the least of which was labor trouble. In this work he took a great interest, and spent long hours, at times under considerable strain, which latter fact may perhaps account partly for the suddenness with which he succumbed to an attack of pneumonia, which with influenza was raging at the time. It is a strange coincidence that an article written by him, on the above work, was published in *Engineering News-Record* of January 30, 1919, the day of his death.

Mr. Sauer was married in 1913, to Doris C. Sparrell, of Everett. He was one who evidently appreciated his home and family, as he often spoke of them in conversation with his associates. He had three daughters, — Cynthia Sparrell, Dorothy Neale, and Betty Frances. His companionable nature gained him many friends, by whom his loss is keenly felt.

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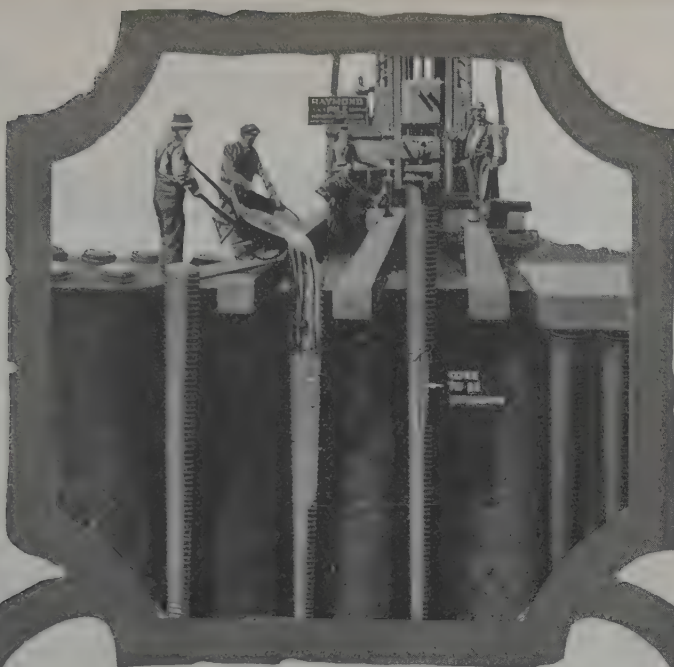
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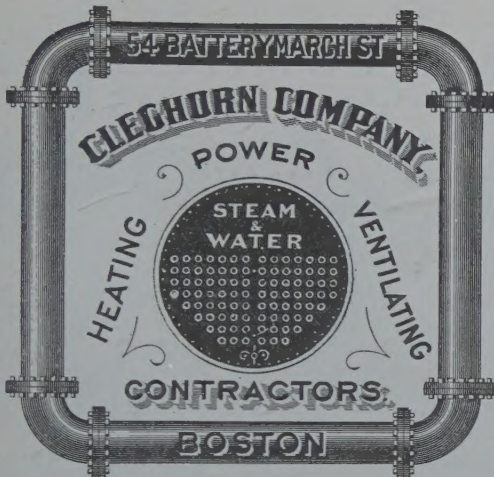
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